

SMC-TR-96-11

**MAINTENANCE MANUAL FOR REFRIGERATION
SYSTEM MONITOR**

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May 1996

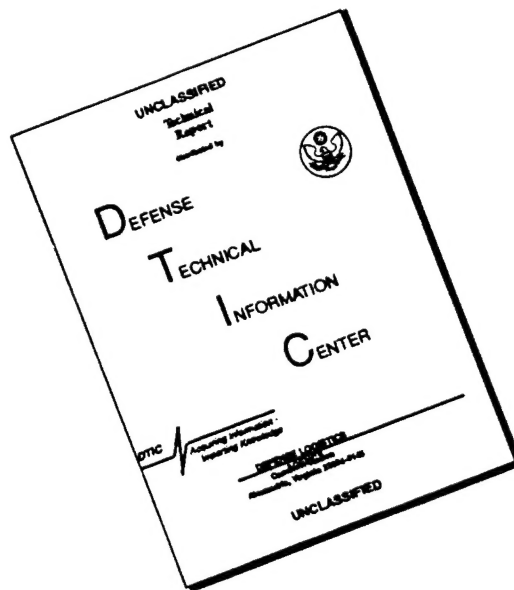
Prepared for:
SMC/SDFE, Los Angeles Air Force Base, CA 90245-4683
Under Contract No. F29601-94-C-0013

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REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
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1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE May 1996		3. REPORT TYPE AND DATES COVERED Final; Feb 94 - Apr 96
4. TITLE AND SUBTITLE Maintenance Manual for Refrigeration System Monitor			5. FUNDING NUMBERS F29601-94-C-0013	
6. AUTHOR(S) Ullrich Hesse				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Spauschus Associates, Inc. 300 Corporate Center Court Stockbridge, GA 30281			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) SMC/SDFE 160 Skynet Street Suite 2315 Los Angeles AFB, CA 90245-4683			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for Public Release; Distribution is Unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) A refrigeration system monitor has been developed which will provide an early warning that a refrigeration or air-conditioning system is experiencing internal problems. The monitor separates non-condensable gases from the flowing refrigerant and provides an external signal when a significant amount of gases have been collected. The presence of these non-condensable gases indicates that one or more problems are developing, including incomplete evacuation, suction side leaks and compressor bearings operating in a boundary lubrication regime. The type of gas collected is indicative of the specific malfunction. This document describes procedures for routine maintenance of the monitor.				
14. SUBJECT TERMS Refrigeration, Air conditioning, monitor, non-condensable gas, Refrigeration system monitor			15. NUMBER OF PAGES 6	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL	

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1.0 MAINTENANCE OF THE MONITOR

1.0 General Purpose

The general purpose of the maintenance manual is to provide a guideline for routine maintenance and troubleshooting procedures for the operation of the Non-Condensable Gas Monitor consisting of a separation unit and a controller.

For general description, installation, calibration, and operation of the Non-Condensable Gas Monitor, see the User Manual.

1.1 Opening of the Separation Unit

The separation unit must be opened for internal cleaning, internal leak testing, and repair. The separation unit (Figure 1 on page 6) consists of the housing and the base plate, and the front panel is directly mounted to the base plate. Most of the components of the separation unit are installed on the base plate or on the front panel. Only the fan for air circulation and the air inlet and outlet ports are mounted to the housing.

The front plate / base plate unit slides out of the remaining housing by removing the 6 hex-cap screws on the edges of the front plate. For cleaning procedures, leak testing, and most repair measures it is sufficient to slide the front plate / base plate unit out of the housing to the stopper. A full removal of the front panel / base plate unit is usually not necessary.

In case a full removal of the front panel / base plate unit is needed the fan must be disconnected by unplugging the wire connector, and the refrigerant lines to the refrigerant cycle must be disconnected, which will necessitate reclaim of system refrigerant. This operation requires refrigeration technician skills and must be performed in accordance to Federal guidelines regarding release of refrigerant to the atmosphere. For full removal, the front plate / base plate unit must be slid to the stopper, slightly lifted, and finally pulled out.

1.2 Inspection of the Separation Unit

Regular inspection measures to be performed on the closed separation unit are as follows:

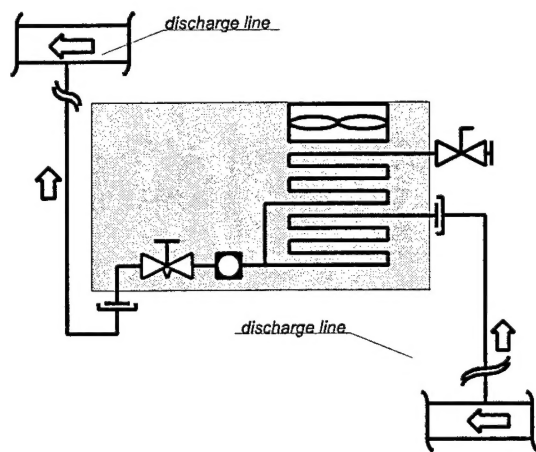
- Check for any loose connection or component; loose connections and components must be fixed.

- Check and remove restrictions at air intake and outlet ports - there is one air intake port on the top of the unit and three air outlet ports on the sides and at the rear of the unit (see user manual);
- Check refrigerant inlet port and refrigerant outlet port for possible leakages - leakage is often indicated by presence of lubricant around joints.
- If a refrigerant leak is indicated a precise leak testing procedure has to be performed, and the leaking connection or part has to be repaired or replaced. This operation requires refrigeration technician skills and must be performed in accordance to Federal guidelines regarding release of refrigerant to the atmosphere.
- Check refrigerant system for normal operation conditions: compressor running; system is performing cooling.
- Compressor discharge line temperature significantly (at least 30 F) above the air temperature used to cool the condenser is required when the refrigerant cycle is under normal operating conditions.
- Check that air circulates through the monitor unit by insuring air flow at the air intake port - use small smoke flow indicator or other appropriate method;
- If no air circulation can be determined and the air inlet and air outlet ports have been found not to be blocked the unit must be opened (see: " Opening of the Separation Unit ").
- After opening of the unit, check for and remove any dust or blockages. If needed the air flow channels and ports may be cleaned by brushing.

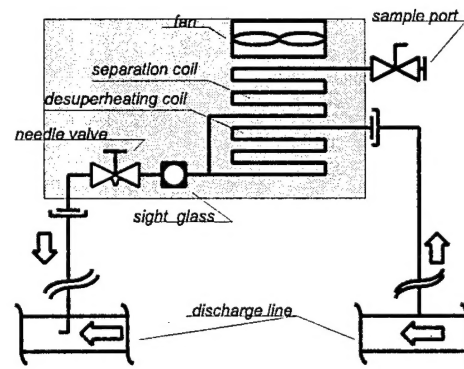
- The fan must be checked for proper operation. If the fan is not working properly, check for loosened cable connections and for sufficient power supply by unplugging and measuring the DC voltage (8 .. 14 V DC between the blue and the red cable). If needed, reset the adjustment of the temperature switch on the control unit, fix loosened cable connections, or replace the fan (type: Papst Variofan 8412 GMV).
- Check to insure that the temperature switch and the fan control temperature sensor for connection to the pipe. The sensor (green wires) and the switch (red wires) are connected to the surface of the pipe between the refrigerant inlet port and the desuperheating coil.
- Check sight glass for two phase flow - a mixture of liquid and gaseous refrigerant should flow through the sight glass;
- If sufficient two phase flow is not present, first check to see if the refrigeration system is under normal operation conditions and the superheat of the discharge gas is sufficient (see above).
- If liquid refrigerant is flowing through the sight glass, slowly open the needle valve (located on the front of the panel) until two phase flow is visible.
- If refrigerant vapor is flowing through the sight glass close the needle valve slowly until sufficient two phase flow occurs. Note: Do not close the needle valve fully!
- If sufficient two phase flow cannot be established, check the installation for sufficient down stream flow. Connecting tubing where liquid refrigerant or remaining lubricant may form a syphon, and thus hinder the refrigerant flow, must be avoided (see figure 2). Note: Do not mistake lubricant droplets

transferred with the refrigerant and remaining in the bottom of the sight glass for liquid refrigerant.

- Check cable and connection to controller for proper connection and possible damage;



*wrong installation
(risk of liquid syphon)*



*recommended installation
(liquid down stream)*

Figure 1: Installation to Avoid Blocking of Refrigerant Flow Due to Liquid Syphon

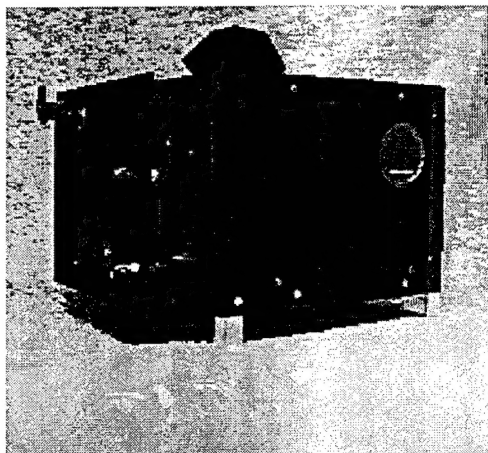
1.3 Inspection of the Controller

Regular inspection measures to be performed on the controller are as follows:

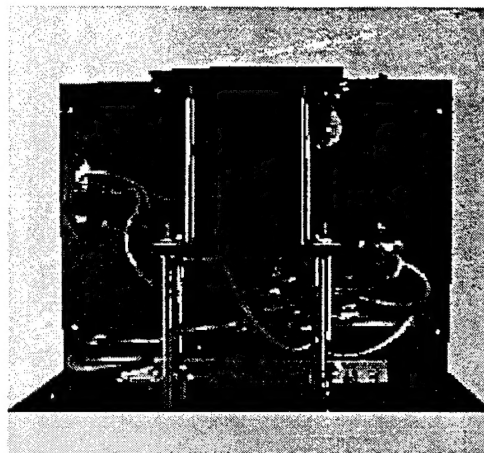
- Check the controller for any loose cable connection or component; loose cable connections and components have to be fixed.
- Check power control LED; if LED is not on and power switch is in "on" position check for proper power supply - a 12 V DC power supply is delivered with the controller;
- Check timer switch for desired setting; Position E (see Table 1 in User Manual) producing timer duration of 1800 is a good starting setting.

Note: Opening and internal inspection and repair of the controller is not recommended. In case of malfunction contact :

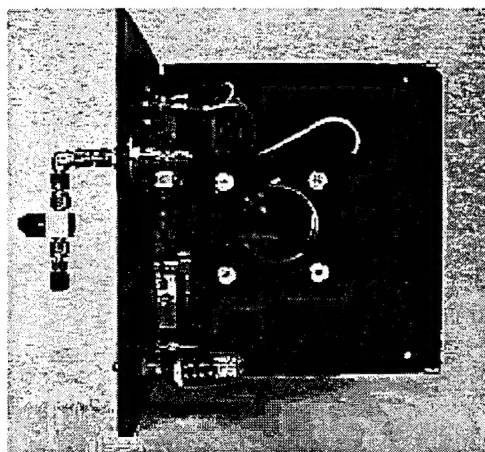
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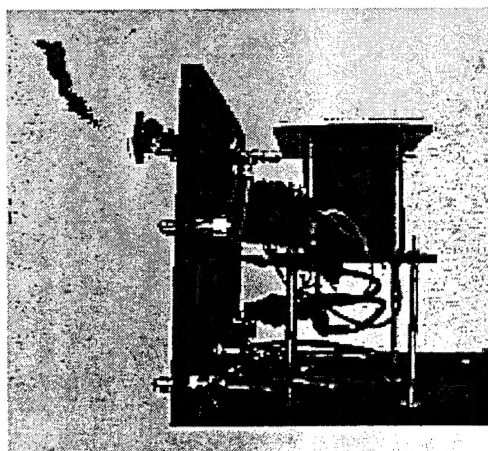
HOUSING W/SLIDING BASE



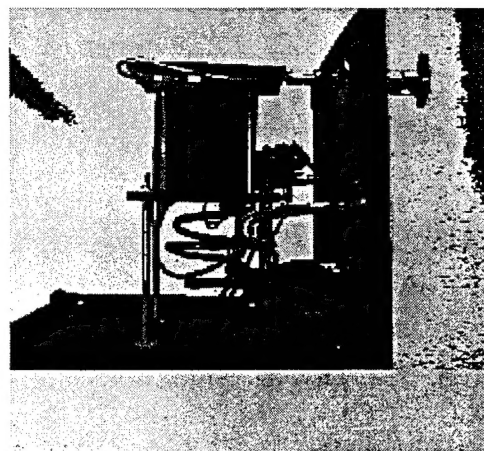
REAR BASE



TOP SPIRAL VIEW



LEFT SIDE VIEW



RIGHT SIDE VIEW

Figure 1: Different Interior Views of the Monitor